

## Model Development Phase Template

Date	26th June 2025
Team ID	LTVIP2025TMID42853
Project Title	Revolutionizing Liver Care: Predicting Liver Cirrhosis Using Advanced Machine Learning Techniques.
Maximum Marks	4 Marks

### Initial Model Training Code, Model Validation and Evaluation Report

The initial model training code will be showcased in the future through a screenshot. The model validation and evaluation report will include classification reports, accuracy, and confusion matrices for multiple models, presented through respective screenshots.

#### Initial Model Training Code:

##### NAIVE BAYES

```
from sklearn.naive_bayes import GaussianNB

nb = GaussianNB()
nb.fit(X_train, y_train)
```

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```
.. GaussianNB()
```

##### RANDOM FOREST

```
from sklearn.ensemble import RandomForestClassifier

rf = RandomForestClassifier()
rf.fit(X_train, y_train)
```

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```
.. RandomForestClassifier()
```

##### LOGISTIC REGRESSION CV

```
from sklearn.linear_model import LogisticRegressionCV

# Logistic Regression CV
lcv = LogisticRegressionCV(cv=5)
lcv.fit(X_train, y_train)
```

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```
.. LogisticRegressionCV(cv=5)
```

##### RIDGE CLASSIFIER

```
from sklearn.linear_model import RidgeClassifier

# Ridge Classifier
rg = RidgeClassifier()
rg.fit(X_train, y_train)
```

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```
... RidgeClassifier()
```

##### SUPPORT VECTOR CLASSIFIER [ SVC ]

```
from sklearn.svm import SVC

# Support Vector Classifier (SVC)
svc = SVC()
svc.fit(X_train, y_train)
```

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```
... SVC()
```

##### LOGISTIC REGRESSION

```
from sklearn.linear_model import LogisticRegression

log = LogisticRegression()
logistic = log.fit(X_train, y_train)
```

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## KNN

```
[162] from sklearn.neighbors import KNeighborsClassifier

knn = KNeighborsClassifier()
knn.fit(X_train, y_train)

... KNeighborsClassifier()
```

## XGBOOST

```
9] from xgboost import XGBClassifier
model=XGBClassifier()
model.fit(X,y)

XGBClassifier(base_score=None, booster=None, callbacks=None,
               colsample_bylevel=None, colsample_bynode=None,
               colsample_bytree=None, device=None, early_stopping_rounds=None,
               enable_categorical=False, eval_metric=None, feature_types=None,
               gamma=None, grow_policy=None, importance_type=None,
               interaction_constraints=None, learning_rate=None, max_bin=None,
               max_cat_threshold=None, max_cat_to_onehot=None,
               max_delta_step=None, max_depth=None, max_leaves=None,
               min_child_weight=None, missing=nan, monotone_constraints=None,
               multi_strategy=None, n_estimators=None, n_jobs=None,
               num_parallel_tree=None, random_state=None, ...)
```

## Model Validation and Evaluation Report:

Model	Classification Report	Accuracy	Confusion Matrix
Naive Bayes	<pre>Classification Report (Naive bayes):               precision    recall  f1-score   support       0       0.68       0.72       0.70         68      1       0.84       0.81       0.82        122   accuracy          0.78        190   macro avg       0.76       0.77       0.76        190  weighted avg     0.78       0.78       0.78        190</pre>	35.79 %	<pre>Confusion Matrix (Naive bayes): [[ 49  19]  [ 23  99]]</pre>
Random Forest	<pre>Classification Report ( Random Forest ):               precision    recall  f1-score   support       0       0.84       0.71       0.77         68      1       0.85       0.93       0.89        122   accuracy          0.85        190   macro avg       0.85       0.82       0.83        190  weighted avg     0.85       0.85       0.84        190</pre>	73.16 %	<pre>Confusion Matrix ( Random Forest ): [[ 48  20]  [  9 113]]</pre>
Logistic Regression CV	<pre>Classification Report (Logistic Regression CV):               precision    recall  f1-score   support       0       0.81       0.63       0.71         68      1       0.82       0.92       0.86        122   accuracy          0.82        190   macro avg       0.81       0.78       0.79        190  weighted avg     0.82       0.82       0.81        190</pre>	73.16 %	<pre>Confusion Matrix (Logistic Regression CV): [[ 43  25]  [ 10 112]]</pre>

Ridge Classifier	<pre> Classification Report (Ridge Classifier):               precision    recall  f1-score   support        0       0.85      0.68      0.75         68       1       0.84      0.93      0.88        122     accuracy          0.84         190   macro avg          0.85      0.81      0.82         190  weighted avg          0.84      0.84      0.84         190 </pre>	35.79 %	<pre> Confusion Matrix (Ridge Classifier): [[ 46  22]  [  8 114]] </pre>
Support Vector Classifier	<pre> Classification Report (Support Vector Classifier):               precision    recall  f1-score   support        0       0.50      0.09      0.15         68       1       0.65      0.95      0.77        122     accuracy          0.64         190   macro avg          0.58      0.52      0.46         190  weighted avg          0.60      0.64      0.55         190 </pre>	35.79 %	<pre> Confusion Matrix (Support Vector Classifier): [[  6  62]  [  6 116]] </pre>
Logistic Regression	<pre> Classification Report (Logistic Regression):               precision    recall  f1-score   support        0       0.80      0.57      0.67         68       1       0.79      0.92      0.85        122     accuracy          0.79         190   macro avg          0.80      0.75      0.76         190  weighted avg          0.79      0.79      0.79         190 </pre>	74.21 %	<pre> Confusion Matrix (Logistic Regression): [[ 39  29]  [ 10 112]] </pre>
KNN	<pre> Classification Report (KNN):               precision    recall  f1-score   support        0       0.88      0.72      0.79         68       1       0.86      0.94      0.90        122     accuracy          0.86         190   macro avg          0.87      0.83      0.84         190  weighted avg          0.86      0.86      0.86         190 </pre>	86.32 %	<pre> Confusion Matrix (KNN): [[ 49  19]  [  7 115]] </pre>
XG Boost	<pre> Classification Report (XGBoost):               precision    recall  f1-score   support        0       0.83      0.71      0.76         68       1       0.85      0.92      0.88        122     accuracy          0.84         190   macro avg          0.84      0.81      0.82         190  weighted avg          0.84      0.84      0.84         190 </pre>	64.21 %	<pre> Confusion Matrix (XGBoost): [[ 48  20]  [ 10 112]] </pre>